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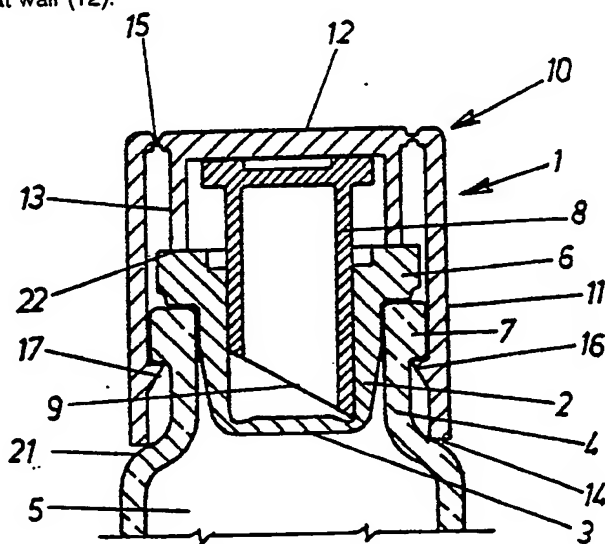
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54 Closure for bottles and the like, comprising a reservoir with a breakable bottom.

57 A closure in plastic material for monodose bottles having a reservoir (2) with a breakable bottom (3), a cylindrical element (8) with the lower end (9) sideways cut being inserted in the reservoir (2), and also including a sealing cap (10) folded around the bottle neck, wherein a breaking line (19) is provided, which extends all over the height of the cap, interconnected with a circular section which separates said cover (11) from the upper flat wall (12).



**FIG. 1**

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# CLOSURE FOR BOTTLES AND THE LIKE, COMPRISING A RESERVOIR WITH A BREAKABLE BOTTOM.

The object of said invention is a closure of plastic material for monodose bottles and the like, of the kind enclosing a reservoir housed in the bottle-neck and containing a substance generally in powder form, which is dropped into the liquid contained in the bottle by breaking said reservoir.

The breaking of the bottom takes place acting on a pressing element, provided with a cylindrical body, penetrating the reservoir with one end sideways cut; said operation is performed after the removal of a sealing cap covering and protecting the whole against any accidental blow or tempering.

The sealing cap can be made of aluminium or plastic, which is the case of said invention.

Said kinds of bottles being monodose, the sealing cap, once removed, must not be reused.

Therefore it is the matter of rendering as easy as possible for the user to remove the sealing cap.

Known sealing caps of plastic material are generally provided with a grip tongue; by pulling it a sealing wrapper is removed or breaking of the cap is caused along fixed breaking lines.

Said known caps are unlikely manually removable, because it is rather difficult to seize the tear tongue with a nail and also because there is a certain resistance in the tearing start.

Therefore it is often necessary to use a tool for opening the cap.

Moreover, if the grip tongue projects out of the peripheral surface of the cap, there are problems during the cap application, e.g. jamming of application machines, especially when these work at high speed.

Purpose of said invention is to eliminate the above mentioned inconveniences, by proposing a sealing cap of plastic material for closures, with a reservoir provided with a breakable bottom, said sealing cap being very simple made and very easy in use.

The sealing cap according to said invention shows a breaking line, which develops substantially all over the height of the sealing cap and extends in a circumference on the cap upper flat wall, in the area that connects said cap and the cover, with an interruption which produces a solid section, adjacent to the vertical breaking line, which is disposed on the cover.

In the upper part of the cover, at the side which is opposite to the one affected by the breaking line, a hollow cutting is provided, which extends till the cap upper wall, in order to form an inducement for the breaking of said cap.

In fact, acting for instance with the thumb in correspondence of the hollow cutting and exerting a pressure or traction upwards on the cap upper

wall, at the beginning the breaking takes place along the circumference section of the breaking line provided on said cap, and then along the vertical section provided on the cover, producing the complete opening of the cap, which can be easily removed from the bottle.

The line along which the breaking takes place can be a weakening line of the material or a pre-fracturing line with small bridges connecting the parts of the cap to be separated, or a mixed line of weakening and pre-fracturing.

The cap is folded around the bottle-neck by means of a continuous or discontinuous annular raising, provided within its cover, showing an inner surface inclined in order to form an inducement during the cap application to the bottle.

Preferably, the cap cover extends as far as it rests with its lower edge on the bottle shoulder, in order to avoid any removal of the cap from the bottle unless acting in said way.

From the cap upper wall a tubular projection comes down, which covers the pressing element and rests lower down on the reservoir annular edge, in order to avoid that accidental blows on said cap upper wall are transmitted to the pressing element, at the risk of breaking the reservoir breakable bottom.

Further features of said invention will become clearer in the following detailed description, referred to a preferred exemplificative but not limitative embodiment, shown in the enclosed drawings, wherein:

fig. 1 is a median sectional view of the closure according to the invention, applied to a bottle

fig. 2 is an axonometric view of the closure shown in fig. 1

fig. 3 is a top plan view of the sealing cap before the breaking

fig. 4 is a median sectional view of a different embodiment of the closure according to the invention, applied to a bottle, taken according line I-I of fig. 6

fig. 5 is an axonometric view of the closure shown in fig. 3

fig. 6 is a top plan view of the sealing cap shown in fig. 3, before breaking.

As regard to said figures, reference 1 indicates the whole closure according to the invention, enclosing a reservoir 2, provided with a breakable bottom 3, housed by forcing in the neck 4 of a bottle 5 and showing on the upper part an annular edge 6 superimposed to the annular edge 7 of the bottle opening.

In the reservoir 2 a cylindrical hollow element 8

is housed with its lower end 9 sideways cut.

During the use, the pressing of the cylindrical element 8 downwards causes the breaking of the breakable bottom 3, and determines the dropping of a substance in powder form contained in the reservoir 1 into the liquid contained in the bottle 5, to which it has to be mixed.

Both the reservoir 2 and the cylindrical element 8 are of plastic material and are enclosed in a sealing cap 10, of plastic material, too.

The cap 10 shows a peripheral cover 11, disposed around the neck 2 of the bottle and an upper flat wall 12, connected to the cover 11 by small connecting bridges 15, in order to constitute a circular breaking line, interrupted in a section 18- (see fig. 2 and 3), which avoids the complete separation of the wall 12 from the cover 11 during the cap opening, as described better later on.

Of course, the connection between the cover 11 and the cap upper wall 12 can also be constituted by a material weakening line.

Within the cover 11 a continuous or discontinuous annular raising 16 is provided, which engages, owing to a transitory elastic deformation, below the annular edge 7 of the bottle opening.

The annular raising shows an inner inclination or chamfer 17 apt to facilitate the application of the cap to the bottle.

The raising 16 may be made of solid material, as shown in fig. 1, or in the shape of flexible tabs, in order to have greater elasticity.

The cover 11 of the cap 10 can rest with its lower edge 14 immediately under the annular edge 7 of the bottle opening, or, more conveniently, extend till the bottle shoulder 21, as shown in fig. 1.

this last solution allows in any case the cap breaking, if an attempt is made to extract it from the bottle, without performing the correct operations, described later on.

On the cover 11 of the cap 10 a weakening or a pre-fracturing line 19 is provided, which extends substantially upright all over the height of said cover and is connected to the circular breaking line provided on the cap upper flat wall 12, in correspondence of said solid section 18.

At the opposite site of the breaking line 19 a cutting 20 is provided, upwards hollow and extending to the circular breaking line provided on the cap upper wall 12, in order to facilitate the removal of said cap.

Then, from the upper flat wall 12 of the cap 10 an inner tubular continuous or discontinuous raising 13 comes down, which encircles the upper part of the cylindrical element 8.

The lower edge 22 of the tubular raising 13 rests on the annular edge 6 of the reservoir 2, in order to avoid that accidental blows on the cap upper wall 12 are transmitted to the cylindrical

element 8, at the risk of breaking the breakable bottom 3.

The removal of the cap 10 takes place acting with the finger of a hand, possibly with a thumb in correspondence of the cutting 20 provided on the cover 11, in order to exert a pressure or a traction upwards on the cap flat wall 12, causing the breaking of the small bridges 15, which connect said cap to the cover 11, without determining the complete breakaway, because of the solid section 18. Continuing to exert a traction on the cap flat wall 12, the breaking of the weakening or pre-fracturing line 19, provided on the cover 11, is caused, and then the complete cap opening, which can easily be removed from the bottle.

With reference to figures from 3 to 6, reference 101 indicates the whole closure according to a second embodiment of the invention, enclosing a reservoir 102, provided with a breakable bottom 103, housed by forcing in the neck 104 of a bottle 105 and showing in the upper part an annular edge 106, superimposed to the annular edge 107 of the bottle opening. In the reservoir 102 a cylindrical hollow element 108 is housed, with its lower end 109 sideways cut.

During the use, the pressing of the cylindrical element 108 downwards causes the breaking of the breakable bottom 103, and determines the dropping of a substance in powder contained in the reservoir 102 into the liquid contained in the bottle 105, to which it has to be mixed.

Both the reservoir 102 and the cylindrical element 108 are of plastic material and are enclosed in a sealing cap 110, of plastic material, too.

The cap 110 shows a lower cylindrical section 111, covering at least the upper part of the bottle-neck 104, and an upper cylindrical section 112, of a reduced diameter, covering the pressing element 108.

The reduced diameter of the cylindrical section 112 causes the resting of its lower edge 113 on the annular edge 106 of the reservoir 102, in order to avoid that accidental blows on the upper part 114 of the cap 110 are transmitted to the cylindrical element 108, at the risk of breaking the breakable bottom 103.

The two cylindrical sections 111 and 112 are interconnected each other by an annular flat wall 115.

Close to the lower edge of the cylindrical section 111 a continuous or discontinuous inner annular raising 116 is provided, engaging, owing to a transitory elastic deformation, below the annular edge 107 of the bottle opening.

The raising 116 may be made of solid material, as shown in fig. 4, or in the shape of flexible tabs, in order to have greater elasticity.

The cylindrical section 111 of the cap 110 can

rest with its lower edge immediately below the annular edge 107 of the bottle opening or extend till the bottle shoulder 121, as shown by the dash lines in said fig.4.

This last solution allows in any case the cap breaking, if an attempt is made to extract it from the bottle without performing the correct opening operations, described later on.

The upper flat wall 114 of the cap 110 is connected to the cylindrical section 112 by small connection bridges 119, in order to determine a circular breaking line, as shown in fig.5 and 6.

It is anyway clear that the interconnection between the flat wall 114 and the cylindrical section 112 can also be constituted by a material weakening line.

The circular breaking line is interrupted by a solid section 120, close to which it is connected to a weakening or pre-fracturing line 118, extending substantially upright all over the cap height, and affecting the two cylindrical sections 111 and 112 and the flat annular wall, which interconnects them.

On the upper cylindrical section 112, at the side opposite to the one affected by the breaking line 118, a curved cutting 122 is provided, which turns its concavity upwards and flows in correspondence of the circular breaking line provided on the cap upper wall 114, in order to form an inducement during the opening of said cap.

The removal of the cap 110 takes place by acting with the finger of a hand, preferably the thumb, in correspondence of the cutting 122 and exerting a pressure or a traction upwards on the upper flat wall 114, causing at the beginning the breaking of the small bridges 119, which connect said flat wall to the cap upper cylindrical section 112, without determining the complete breakaway because of the solid section 120.

Continuing to exert a traction on the flat wall 114, the breaking continues along line 118, which extends all over the height of the cap, and causes the complete opening of said cap and then an easy removal from the bottle.

Of course the invention is not restricted to the peculiar embodiments previously described and shown in the enclosed drawings, but it is possible to introduce detail changes within the reach of the branch experts, without departing from the scope of the invention.

## Claims

1. A closure in plastic material for monodose bottles and the like, provided with a reservoir with a breakable bottom (3), housed in the neck (4) of the bottle (5) and having an upper annular edge (6) superimposed to the annular edge (7) of the bottle

opening, a cylindrical element (8) with the lower end (9) sideways cut being inserted in the reservoir (2), and also including a sealing cap (10) folded around the bottle neck, characterized by the fact that a breaking line is provided, which extends all over the height of the cap, said breaking line being interconnected with a circular section which separates said cover from the upper flat wall.

2. A closure according to claim 1, characterized by the fact that said breaking line includes a section (19), extending substantially upright all over the cover (11) and interconnected with a circular section that separates the cover (11) from the cap upper flat wall (12), said circular section of the breaking line showing an interruption or a solid section (18) adjacent to section (19) provided on cover (11), a tubular continuous or discontinuous raising (13) coming down innerly from said wall (12) the lower edge (22) of said raising resting on the annular edge (6) of the reservoir (2).

3. A closure of plastic material for monodose bottles according to claim 1, characterized by the fact that said cap (101) includes a lower cylindrical section (111), housed around the bottle neck (104) and an upper cylindrical section (112) for covering said cylindrical element (108), the section (112) being of a reduced diameter in comparison with section (111) in order to rest on the annular edge (106) of the reservoir (102) and being connected to section (11) by a flat annular wall (115), and by the fact that said breaking line includes a section (119) extending all over the height of the cap, affecting the two cylindrical sections (111), (112) and said annular wall (115), connected to a circular section which separates the cap upper wall (114) from the upper cylindrical section (112), said circular section of the breaking line showing an interruption or solid section (12) adjacent to the connection with the section (118).

4. A closure according to claims 2 or 3, characterized by the fact that said breaking line is obtained through the weakening of the material or of pre-fracturing with connection bridges between the parts to be separated, or in a mixed way, by weakening and pre-fracturing.

5. A closure according to claims 1 or 2, characterized by the fact that on the cover (11) on the side opposite to section (19) of the breaking line a cutting (20) is provided, upward hollow and flowing in the circular section of the breaking line provided on the cap upper wall.

6. A closure according to claims 1 or 3, characterized by the fact that on the upper cylindrical segment (112) of the cap (110) at the side opposite to the one affected by section (118) of the breaking line a cutting (122) is provided, upward hollow and flowing in the circular section of the breaking line which separates the cap upper wall (114) from said

upper cylindrical section (112) in order to form an inducement during the cap removal.

7. A closure according to one of the claims from 1 to 3, characterized by the fact that within the cover (11), (111) a continuous or discontinuous anular raising (16), (116) is housed, apt to be housed below the bottle anular edge (7), (107) and showing a part (17), (117) inclined or chamfered, that forms an inducement during cap application to the bottle.

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8. A closure according to claim 7, characterized by the fact that said anular raising (16), (116) is made of solid material or in a shape of flexible tabs.

9. A closure according to one of the claims 1,2 or 7, characterized by the fact that the cover (11) of the cap (10) rests with its lower edge (14) below the anular edge(7) of the bottle opening.

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10. A closure according to one of the claims 1,2 or 7 characterized by the fact that the cover (11) of the cap (10) extends till the shoulder(21) of the bottle (5).

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11. A closure according to one of the claims 1,3 or 7 characterized by the fact that said cylindrical section (11) housed around the bottle neck extends till the shoulder (21) of said bottle.

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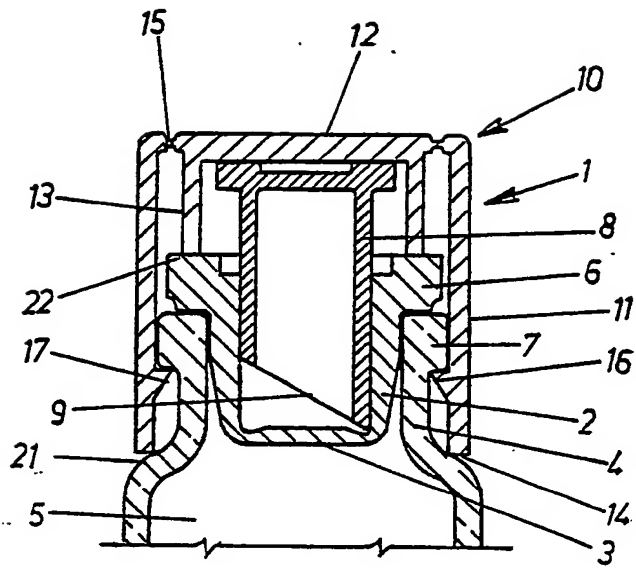


FIG. 1

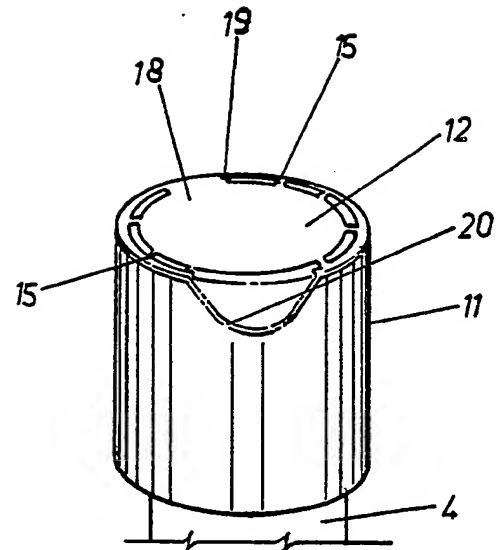


FIG. 2

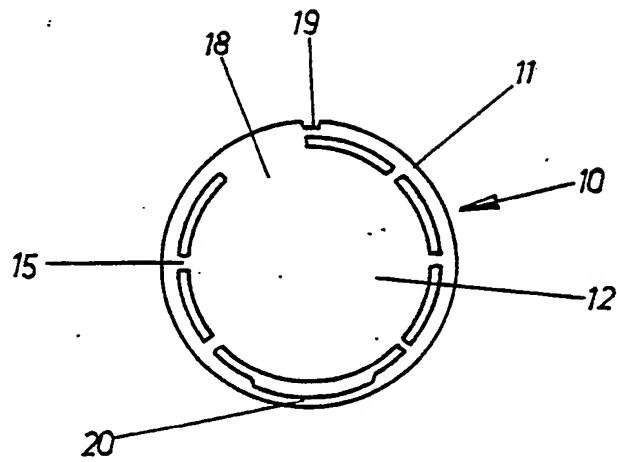


FIG. 3

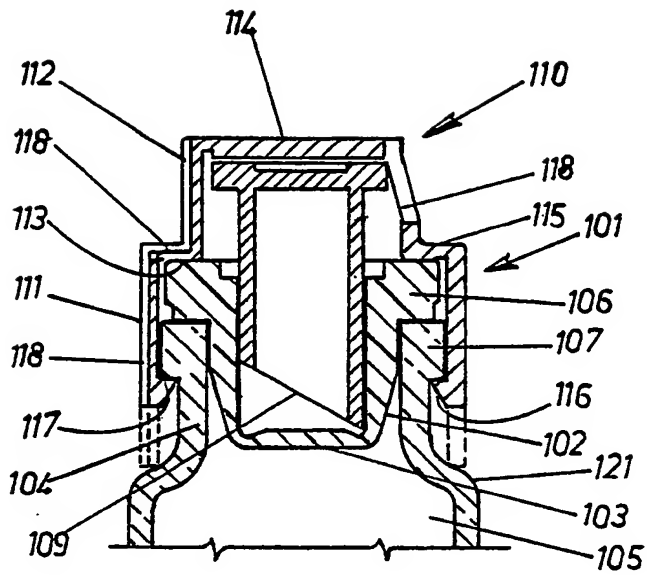


FIG. 4

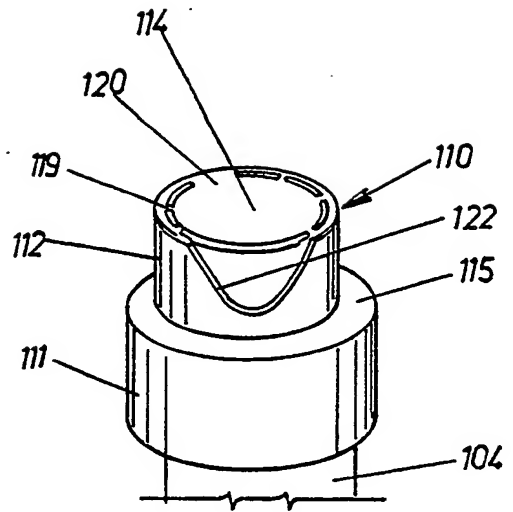


FIG. 5

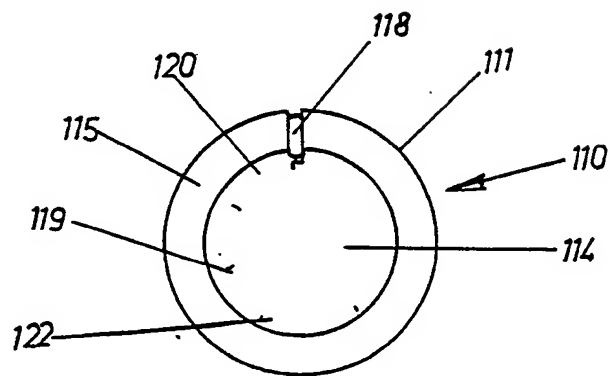


FIG. 6



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. CL.5)
X	DE-A-2 738 551 (FARMAPROF) * Page 7, paragraphs 1-4; page 8, paragraph 2; page 9, paragraph 4; figures 1,3,9 *	1,5-9	B 65 D 51/28 B 65 D 55/08
Y	---	2-4,10-11	
Y	FR-A-2 170 772 (INGE) * Page 7, lines 8-14; figure 1 *	2,4	
Y	---	3	
Y	FR-A-2 077 188 (VETRERIA FRATELLI BENECHCHI DI BENECHCHI RENATO) * page 2, lines 5-9; figures 1-2 *		
Y	---	10-11	
Y	US-A-3 866 782 (WESTFALL) * Column 2, lines 60-64; figure 2 *		
A	---	1	
A	GB-A-1 042 626 (MANARESI) * Whole document *		
			TECHNICAL FIELDS SEARCHED (Int. CL.5)
			B 65 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20-11-1989	Examiner BRIDAULT A.A.Y.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	